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EXAMINER	
WANG, LEMING	
ART UNIT	**PAPER NUMBER**
2638	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/886,998	Applicant(s) FARRIES, MARK
	Examiner Leming Wang	Art Unit 2638

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 03 August 2005.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-17 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-17 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's arguments with respect to claims 1-17 have been considered, Examiner does not agree with the applicant's arguments.

Applicant argues:

A. "if the light demultiplexing and branching unit 107A were to pass two or more wavelength channels to optical demux 30-2, the signal stream emanating from the light branching unit 25 to the identification element would also carry two or more wavelength channels. As two or more wavelength channels are superimposed simultaneously on the same light conductor, a photodetector exposed to such a stream would sum all of the channel signals into a single electrical signal. Under such circumstances, the identification function could not be performed by the identification element." And "In *Ooi*'s case, the clock recovery circuit 21 (Fig. 12) can use only a single wavelength optical signal since multiple wavelength signals in the absence of supplementary wavelength demux will not be identified properly, as explained earlier. In the case of instant disclosure, the clock recovery signal is derived from a signal comprising a plurality of optical wavelengths.".

B. About Claims 5,6,7,8, "the wavelength spacing in this case is an integer multiple of the FSR. However, the instant application discloses the use of non-integer spacings also, which is more general. ".

Examiner's answers:

About argument A, in the system of *Ooi et al.* modified by *Lin et al., Lin et al.* teach that a multi-wavelength signal is demultiplexed into single wavelength channels using wavelength demultiplexing apparatus 350, 351, .., of *Lin et al.* before being sent to time demultiplexing apparatus 30-1, 30-2, .., of *Ooi et al.* , for example, see λ_1, λ_2, ..., λ_n, ..., by DEMUX #1, #2, ..., in Fig.7. Therefore, the clock recovery and identification functions would work properly.

About argument B, in the system of *Ooi et al.* modified by *Lin et al., Lin et al.* teach using FSR in general because *Lin et al.* do not define FSR to be an integral multiple of the channel spacing. Please note that in original claim 6, the limitation is "a non-integer multiple of the predetermined **channel spacing**", but according to *Lin et al.,* FSR is a free spectral range (Col.7, lines 18-19), it is not ITU <u>channel spacing</u>.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-12, and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Ooi et al.* (US Patent No: 6,118,564) in view of *Lin et al.* (US Patent No: 6,728,203)

Regarding claim 1, *Ooi et al.* an optical demultiplexer for demultiplexing an optical signal having a plurality of channels at a predetermined channel spacing comprising: (b) time domain demultiplexing means (For example,107A, 30-1, Fig.7) for receiving one of the plurality of wavelength streams and for dividing the one of the plurality of wavelength streams (One of multi-wavelength signal is input at 107A, Fig.7) into a plurality of time domain demultiplexed wavelength streams (Col.25, lines 31-35);

Ooi et al. differ from the claimed invention in that *Ooi et al.* do not teach (a) demultiplexing means having a frequency spacing larger than the predetermined channel spacing (*Lin et al.* teach that free spectral ranges FSR, 2FSR, .. cause larger spacing than the predetermined space between λ_1, $\lambda_{2, \ldots,}$ λ_n, Fig.7) for receiving the optical signal and for dividing the optical signal by wavelength into a plurality of wavelength streams (*Lin et al.* teach that λ_1, λ_1+ FSR, λ_1 +2FSR, .. , λ_2, λ_2+ FSR, λ_2 +2FSR, .. , .., λ_n, λ_n+ FSR ..., Fig.7, Col.7, lines 18-19) broader than the predetermined channel spacing (*Lin et al.* teach there is the space FSRs between two neighboring wavelengths λ_1, $\lambda_{2, \ldots,}$ λ_n, Fig.7 so the spacing between streams are wider), wherein at least one stream has more than one wavelength channel (*Lin et al.* teach that for a stream, for example, the first stream λ_1, λ_1+ FSR, λ_1 +2FSR, .. , from 320 with wavelength λ_1, consisting with a plurality wavelength channels, the first one λ_1, the second one λ_1+ FSR, the third one λ_1 +2FSR, ..); and (c) optical filtering means (320, Fig.7) for wavelength demultiplexing one of the plurality of time domain demultiplexed wavelength streams into a single channel (λ_1, $\lambda_{2, \ldots,}$ λ_n, λ'_1, $\lambda'_{2, \ldots,}$ λ'_n, Fig.7). Therefore, it

would have been obvious to a person having ordinary skill in the art at the time of the invention to incorporate a demultiplexer apparatus, such as the one of *Lin et al.*, to replace the LIGHT DEMULTIPLEXING & BRANCHING in the system of *Ooi et al.* in order to obtain output signal with larger frequency spacing than that of input signals.

Regarding claim 2, *Lin et al.* further teach a splitting means (375, Fig.7) for splitting the optical signal into at least two sub-signals (Signal steams sent to 310 and 311, respectively, Fig.7) before launching one of the sub-signals into the demultiplexing means (310 and 311, Fig.7).

Regarding claim 3, *Ooi et al.* further teach a clock recovery means (21, Fig.12) for obtaining a clock signal from the one of the plurality of wavelength streams (Signals a input at 42-1, Fig.12) and for providing the clock signal to the time domain demultiplexing means (Clock signal b is sent to OPTICAL SWITCH 42-1, Fig.12) for dividing the one of the plurality of wavelength streams into a plurality of time domain demultiplexed wavelength streams in dependence upon the clock signal (Signal a is divided into I or j based on the clock signal b, Fig.13).

Regarding claim 4, *Ooi et al.* further teach the a plurality of time domain demultiplexing means (30-1, 30-2, .., Fig.7), and the plurality of time domain demultiplexing means for receiving the plurality of wavelength streams (Signals input at 107A, Fig.7; col.2, lines 51-53) and for dividing the plurality of wavelength streams into

a plurality of time domain demultiplexed wavelength streams (f_0, Fig.7 and fig.11), and *Lin et al.* further teach a plurality of optical filtering means (320, Fig.7), each of said plurality of optical filtering means for demultiplexing each of the plurality of time domain demultiplexed wavelength streams into a single channel (λ_1, λ_2, λ_3, .. , Fig.7).

Regarding claim 5, *Lin et al.* further teach a frequency spacing of the demultiplexing means is one of an integer multiple and a non-integer multiple of the predetermined channel spacing (λ_1, λ_1+ FSR, λ_1 +2FSR, .. , Fig.7, Note that FSR is free spectral range, see Col.7, lines 18-19).

Regarding claim 6, *Lin et al.* further teach the integer multiple is two (λ_1+2FSR, .. , Fig.7).

Regarding claim 7, *Lin et al.* further teach the demultiplexing means demultiplexes the optical signal according to a standardized International Telecommunications (Col.7, lines 51-55).

Regarding claim 8, *Lin et al.* further teach the predetermined channel spacing is a frequency spacing according to a standardized International Telecommunications Union (ITU) frequency grid (Col.7, lines 51-55).

Regarding claim 9, *Ooi et al.* further teach the time domain demtlltiplexing means is one of a Lithium Niobate (LiNbO3) modulator (Col.5, line 23) and a semiconductor optical amplifier switch.

Regarding claim 10, *Lin et al.* further teach the optical filtering means is a band-pass filter (320, Fig.7; Col.4, line 11).

Regarding claim 11, *Ooi et al.* further teach the optical signal has a return to zero (RZ) modulation format (Col.2, line 31).

Regarding claim 12, *Ooi et al.* further teach a sum of bit-rates of the plurality of time domain demultiplexed wavelength streams is equal to a bit-rate of the one of the plurality of wavelength streams (For example, in Fig.23, bit rate of signal a is the sum of the bit rate of two demultiplexed signals A and B, Col.53, lines 29-36).

Regarding claim 15, *Ooi et al.* teach a method for demultiplexing a high bit-rate signal on a dense optical grid comprising: performing an optical time domain demultiplexing for dividing at least one of the wavelength streams into a plurality of time demultiplexed streams (Col.25, lines 31-35, for example, one of multi-wavelength signal is input at 107A, and time-demultiplexed by 30-1, 30-2, .., Fig.7)

Ooi et al. differ from the claimed invention in that *Ooi et al.* do not teach the steps (a) providing the high bit-rate signal including a plurality of wavelength channels at a predetermined channel spacing to a coarse wavelength demultiplexer (*Lin et al.* teach

using input multi-wavelength signals into DEMUX #1, #2, .., with predetermined spaces between λ_1, $\lambda_{2, \ldots,}$ λ_n, Fig.7); performing a coarse wavelength demultiplexing for dividing the high bit-rate signal into wavelength streams (*Lin et al.* teach using DEMUX #1, #2, .., to divide the multi-wavelength signal into λ_1, λ_1+ FSR, λ_1 +2FSR, .. , λ_2, λ_2+ FSR, λ_2 +2FSR, .. , .., λ_n, λ_n+ FSR ..., Fig.7, Col.7, lines 18-19) broader than the predetermined channel spacing (*Lin et al.* teach there is the space FSRs between two neighboring wavelengths λ_1, $\lambda_{2, \ldots,}$ λ_n, Fig.7 so the spacing between streams are wider); and (c) and filtering at least one time demultiplexed stream through a wavelength filter (320, Fig.7) for for obtaining at least one individual wavelength channel (λ_1, $\lambda_{2, \ldots,}$ λ_n, λ'_1, $\lambda'_{2, \ldots,}$ λ'_n, Fig.7). Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to incorporate a demultiplexer apparatus, such as the one of *Lin et al.*, to replace the LIGHT DEMULTIPLEXING & BRANCHING in the system of *Ooi et al.* in order to obtain output signal with larger frequency spacing than that of input signals.

Regarding claim 16, *Ooi et al.* further teach the step of identifying a timing signal (TO IDENTIFICATION ELEMENT, Fig.7) from the wavelength streams for performing an optical time domain demultiplexing (30-1, Fig.7) for at least one of the wavelength streams in dependence upon the timing signal (For example, the signal stream f1 is dependent on the clock signal generated at 21, Fig.7).

Regarding claim 17, *Lin et al.* further teach the step of initially splitting the high bit-rate signal into at least two streams (The two streams input at DEMUX #1 and DEMUX #2, respectively Fig.7) and providing each stream into a separate coarse wavelength demultiplexer (DEMUX #1 and DEMUX #2, Fig.7) of different but overlapping wavelength ranges (The first stream λ_1, λ_1+ FSR, λ_1 +2FSR, λ_2, λ_2+ FSR, λ_2 +2FSR, ... , and the second stream (λ'_1, λ'_1+ FSR, λ'_1 +2FSR, λ'_2, λ'_2+ FSR, λ'_2 +2FSR, ... Figs.7 and 8. Note that in Fig.8, the spectra after DEMUX #1 is different but overlapped with the spectra after DEMUX #2).

3. Claim 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Ooi et al.* (US Patent No: 6,118,564) in view of *Lin et al.* (US Patent No: 6,728,203) and further in view of *Pan et al.* (US Patent No: 5,652,814)

Regarding claim 13, *Ooi et al.* and *Lin et al.* teach that an optical demultiplexer for demultiplexing a multiplexed N channel optical signal comprising: splitting means for splitting the multiplexed N chnnnel optical signal into a plurality of multiplexed N channel optical sub-signals (Splitter has M output ports, Fig.7).

The system of *Ooi et al.* modified by *Lin et al.* differs from the claimed invention in that *Ooi et al.* and *Lin et al.* do not teach first demultiplexing means for coarse wavelength demultiplexing the plurality of multiplexed N channel optical sub-signals into M sub-signals, second demultiplexing means for time demultiplexing the M sub-signals

into R sub- signals, and third demultiplexing means for wavelength demultiplexing the R sub-signals into N single channels.

However *Pan et al.* from the same field of endeavor teach wavelength demultiplexing apparatus (Fig.25) with first demultiplexing means (271, Fig.25) for coarse demultiplexing N channel (λ_1, λ_2, λ_3, λ_4, λ_5, λ_6, λ_7, λ_8, Fig.25) into M sub-signals (Sub-signals λ_1, λ_2, λ_3, λ_4, and λ_5, λ_6, λ_7, λ_8, Fig.25) and second demultiplexing means (272, and 273, Fig.25) to demultiplex M signals (Sub-signals λ_1, λ_2, λ_3, λ_4, and λ_5, λ_6, λ_7, λ_8, Fig.25) into R sub-signals (λ_1 and λ_2, and λ_3 and λ_4, λ_5 and λ_6, λ_7 and λ_8, Fig.25) and third demultipleing means (274, 275, 276 and 277, Fig.25) to demultiplex the R signals (λ_1 and λ_2, and λ_3 and λ_4, λ_5 and λ_6, λ_7 and λ_8, Fig.25) to single channel (λ_1, λ_2, λ_3, λ_4, λ_5, λ_6, λ_7, λ_8, Fig.25). Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to incorporate a demultiplexer apparatus, such as the one of *Pan et al.*, to replace the demultipexing means (350 Fig.7 of *Lin et al.*) in the system of *Ooi et al.* modified by *Lin et al.* in order to provide a demultiplexing means for advanced fiberoptic systems of higher performance, low cast, and superior reliability (Col.2, lines 23-26).

Regarding claim 14, *Ooi et al.* further teach a clock recovery means (21, Fig.12) for extracting a clock signal from the M sub-signals for demultiplexing the M sub-signals into the R sub-signals (Signals a input at 42-1, Fig.12) in dependence upon the clock signal (Signal a is divided into I or j based on the clock signal b, Fig.13).

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leming Wang whose telephone number is 571 272 3030. The examiner can normally be reached on 8:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on 571 272 3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Leming Wang
10/6/2005

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER